

Chapter 7 TECHNIQUES OF OBSERVATION

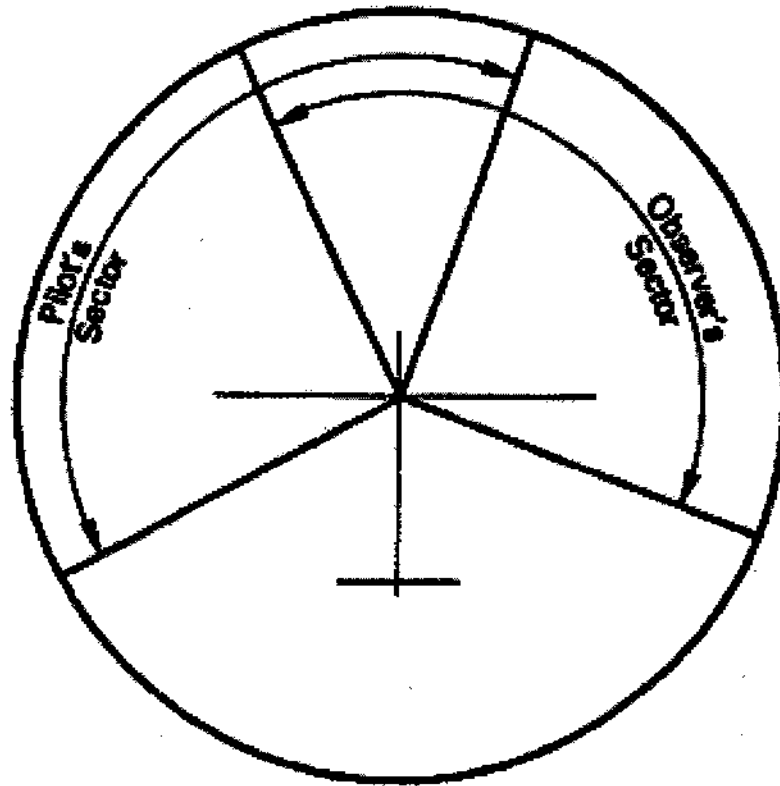
A. AIR CREW/OBSERVERS

1. For SAR and patrol activities, the real payload for the search aircraft is the air crew/observer. While the pilot is a contributor to the observations, his main task is to safely control and navigate the aircraft. The effectiveness of the search or patrol team can be no greater than the effectiveness of the air crew/observer.
2. Effective and efficient observation requires training and experience. Air crew/observer scanning techniques must be accomplished in a systematic way to assure a high degree of coverage of the search or patrol area. Air crew/observers must know what to look for. Objects usually look different from the air than they do from the surface. Moreover, if a crash or sinking is involved, the objects of the search will usually be quite different from the original subject of the search. In addition, once the search object or suspected search object has been sighted, the air crew/observer must know how to retain surveillance of the object while communicating its relative position to the pilot so that the aircraft can be maneuvered into a more advantageous position.

B. AIR CREW/OBSERVER SECTOR ASSIGNMENTS

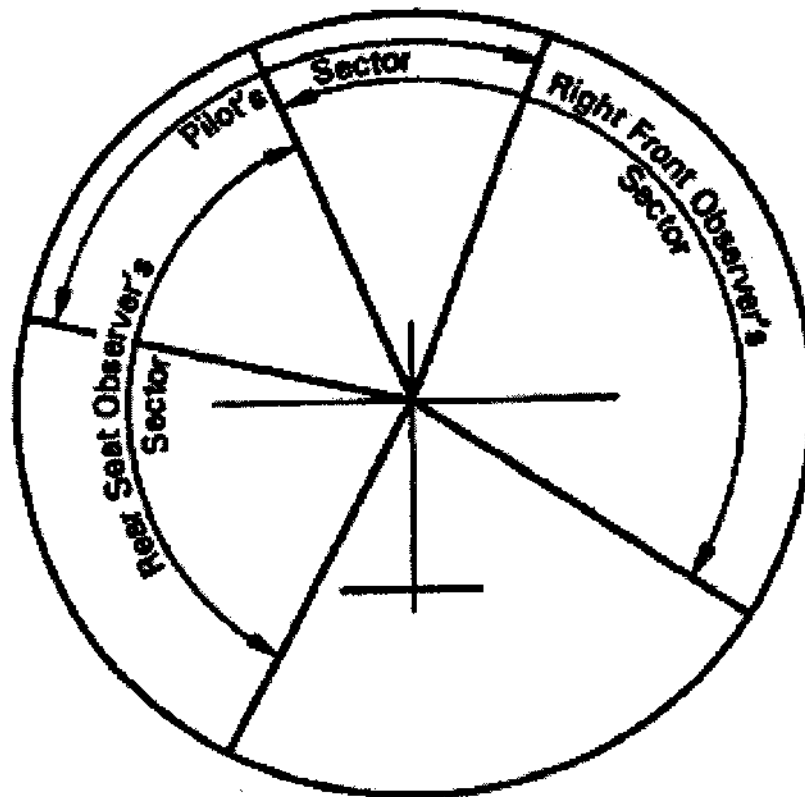
1. The pilot will usually be provided with instructions on the assigned search pattern to be flown. If not, he will determine a pattern including leg directions and track spacing. Based upon the pattern selected, the visibility from the aircraft and the number of air crew/observers aboard, specific relative sectors must be assigned to each air crew/observer.
2. Auxiliary aircraft are light aircraft with one or two engines and seats for 2-6. In two place aircraft, the seats may be tandem (one behind the other) or side-by-side. For tandem seating, the pilot will usually be in the front seat. In this arrangement, the pilot will have to cover the area directly ahead of the aircraft. The rear seat air crew/observer should be assigned to cover both sides alternately.
3. In a side-by-side two place aircraft, the pilot will need to scan outside of the left side of the aircraft as well as observing ahead looking for other aircraft and at the same time maintain control of the aircraft. The air crew/observer in the right seat is assigned to scan ahead of the aircraft as well as the right side (See Figure 7.1).

Fig. 7.1 Observing sectors two-man crew



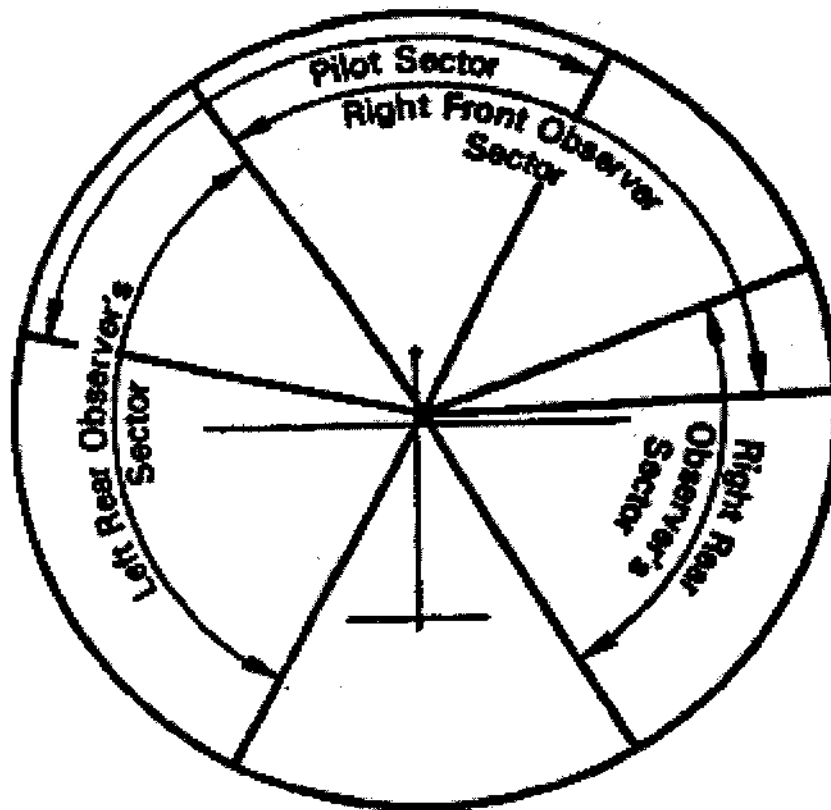
4. Many four-place aircraft will be operated with two or three persons on board. When only two persons are on board, coverage will be the same as for a two place, side-by-side aircraft. When three persons are on board, the air crew/observer in the rear seat should be assigned the position behind the pilot. The rear seat air crew/observer search sector should cover as much of the left side of the aircraft as possible. In high wing aircraft, this can be a sector approaching 180 degrees. In low wing aircraft, the air crew/observer in the rear seat will only be able to search behind the wing effectively. If the piloting duties are to be shifted between occupants of the two front seats, loading of the aircraft should permit the rear-seat air crew/observer to cover either side by shifting position (See Figure 7.2).

Fig. 7.2 Observing sectors three-man crew



5. When all four seats are utilized in a four place aircraft, the air crew/observer in the right rear seat will cover the right side of the aircraft in the same manner as described for the left rear seat air crew/observer above. The right front seat air crew/observer will cover the sector forward of the wing in a low wing aircraft. For a high wing aircraft, this coverage can extend rearwards. A satisfactory assigned limit might be dead ahead; or otherwise assigned based on the configuration of the aircraft structure. Some overlap of coverage between the front and rear seat air crew/observer can be beneficial in the search.

Fig. 7.3 Observing sectors four-man crew



6. For aircraft facilities having more air crew/observer positions, sectors should be assigned depending upon position visibility. The sectors will overlap. This is not objectionable since it will improve the probability of detection.

C. SCANNING PROCEDURES

1. Although aircraft are excellent search platforms because of their altitude advantage and mobility, most small civilian aircraft have some obstructions that limit scanning sectors. This varies with the design of the aircraft and the air crew/observer's position. Generally, it will be much more severe in low wing aircraft than in high wing aircraft. The pilot should evaluate his particular aircraft and inform his air crew/observers of the limitations and how best to compensate for them.

2. The speed of the aircraft affects the efficiency of the air crew/observers by reducing the time in which they can scan a given sector of the surface. In searching, the slower the speed of the aircraft, the greater is the probability of visual detection.
3. Binoculars rapidly bring on eye fatigue in aircraft and may cause nausea. They should be used only to check sightings made by the naked eye. Gyro-stabilized binoculars are preferred and may be obtained at some air stations.
4. When searching at low altitudes, the area closest to the aircraft (where detection probabilities are highest) will be passed quite rapidly. The rapidity with which this area will pass is dependent upon the masking caused by the design of the aircraft and by the speed of the aircraft. Low wing aircraft present a particular problem in this regard. For a moderate speed low-wing aircraft with considerable masking, it may be necessary for rear seat air crew/observers to scan only the area in view behind the wing in order to obtain maximum effectiveness.
5. Most searches by Auxiliary aircraft facilities are apt to involve search over water. Usually, over water searches will provide little or no contrast. Under these conditions air crew/observer's eyes may focus short of the surface without the knowledge of the air crew/observer, and thus compromise the thoroughness of the search. To minimize this phenomenon, air crew/observers should occasionally focus their eyes on some specific items on the surface such as whitecaps or debris. If none is visible, the eyes should be focused periodically on some part of the aircraft such as the wing tips. A short "focusing" period of a second or so will overcome this problem and scanning can be resumed.
6. Motivation is a highly important factor that will affect the performance of a search crew. During the early stages of a search, motivation is high. After fatigue sets in and hope of locating survivors fades maintaining a high level of motivation becomes a problem. Every effort must be made to maintain a high degree of motivation in the search effort to avoid the tendency of the crew just to "go through the motions".
7. Although the human eye can "see" over a wide angle, it focuses sharply only over an angle of about 10 degrees. This means that the detection of a hard-to-see target will usually occur within about 5 degrees of the central position point for the eye. Practically speaking, you must "be looking right at an object" to really see it. Moreover, the scan of the eye must be "stopped" for effective sharp vision. For these reasons, air crew/observers should scan their assigned sectors with discrete movements of the eye. Each movement should be about 3 or 4 degrees. The rate of movement should be two or three shifts per second. To make one scan across a 90 degree sector will take about 10 to 15 seconds.
8. The search of an assigned sector should start close to the aircraft and should sequentially move outward from the aircraft in units of 3 or 4 degrees after each

horizontal scan. Consecutive scans should be in opposite directions. That is, start the first scan from left to right, move up, make the second scan from right to left, move up another 3 to 4 degrees and scan back from left to right again. Continue this sequence to the horizon, or to the limit of meteorological visibility or to a predetermined upper limit.

9. For the pilot and front seat air crew/observer, the scanning should be repeated again by returning the eyes for sequential sweeps starting close to the aircraft. This technique helps compensate for the changes in view caused by the forward motion of the aircraft and insures optimum coverage of the close in area. When flying at low altitudes searching for small objects (such as a life raft, or personnel in water), rear seat air crew/observers should employ a similar technique. In such cases, both front and rear seat air crew/observers should limit their outward scanning. When searching for personnel in the water, this limit should be set at about 1/2 the track spacing for the aircraft at 500 feet. For example for persons in the water, using .25 NM track spacing, the limit should be .125 NM or approx. 250 yards. For life rafts, the limit should be 2.5 miles or less, and for boats under 60 feet in length, 10 nautical miles or less even though the horizon may be over 25 miles distant for an aircraft at 500 feet altitude. Thus for small objects, even under optimum conditions, no search should be made above 10 degrees below the horizon and for rafts, no more than 2 degrees below the horizon. For boats up to 60 feet, the scan will extend virtually to the horizon. If the meteorological visibility is less than optimum, these distances should be further reduced.

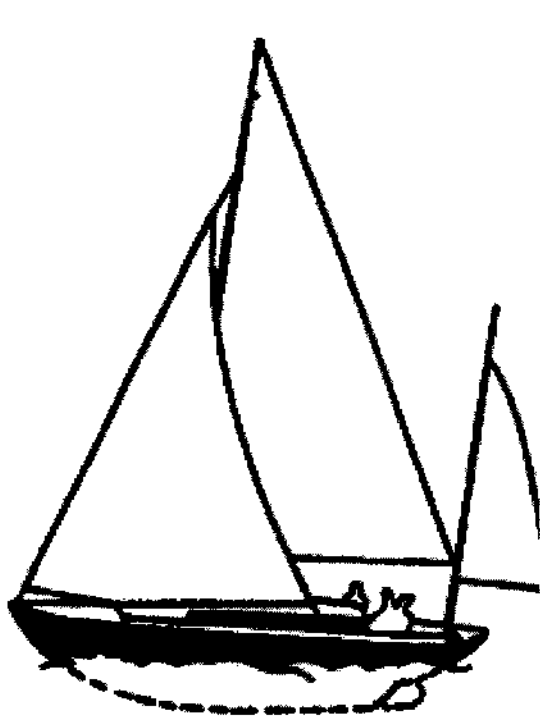
D. VESSEL RECOGNITION

1. A good knowledge of various vessel types and configurations is important. In order to provide accurate reporting it is critical that the vessel be identified and described properly by the reporting aircraft. Most Auxiliarists acquire a working knowledge of the plan view of various surface craft through the public education courses, member training, and experience on the local waters (see figures 7.4. through 7.7.)

Fig. 7.4 Small Sailing Vessels



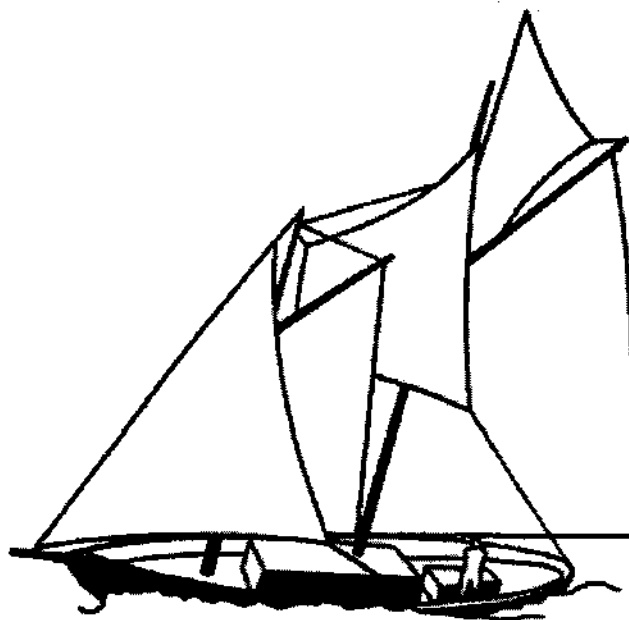
Fig. 7.5 Large Sailing Vessels



YAWL



KETCH



SCHOONER

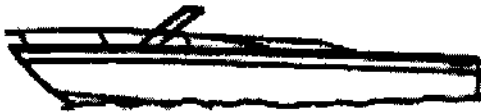
Fig. 7.6 Powered Boats



SKIFF



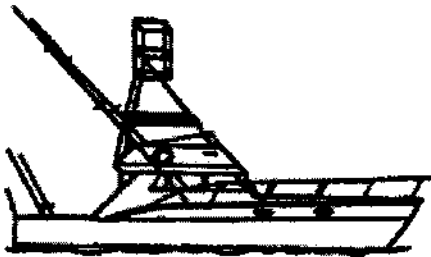
OUTBOARD



INBOARD



CENTER CONSOLE



SPORT FISHERMAN



CRUISER



YACHT

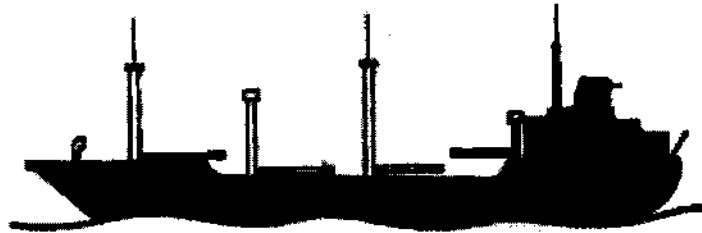
Fig. 7.7 Commercial Vessels



RIVER/INTERCOASTAL TYPE
TOWBOAT & BARGE



TANKER



FREIGHTER



FREIGHTER



PASSENGER

E. SEA STATE EVALUATION

1. The simplest method of estimating wind direction and velocity is to examine wind streaks on the water. These appear as long streaks up and down wind. Whitecaps fall forward with the wind, but are overrun by the waves, thus producing the illusion that the foam is sliding backwards. Knowing this, and by observing the direction of the streaks, wind direction is easily determined. Wind velocity can be accurately estimated by noting the appearance of whitecaps, foam, and wind streaks. Wave height is estimated as a function of wind velocity (see Table 7.1. below).

Table 7.1 Beaufort Wind Scale

BEAUFORT WIND SCALE			
SCALE	WIND (knots)	SEA INDICATIONS	WAVE HEIGHT (feet)
0	Calm	Mirror like	0
1	1-3	Ripples with appearance of scales	1/4
2	4-6	Small wavelets, glassy appearance, do not break	1/2
3	7-10	Large wavelets, some crests begin to break. Scattered whitecaps.	2
4	11-16	Small waves, becoming longer, fairly frequent whitecaps	4
5	17-21	Moderate waves, pronounced long foam, many whitecaps	6
6	22-27	Large waves begin to form, white foam crests are more extensive, some spray	10
7	28-33	Sea heaps up, white foam from breaking waves begins to be blown in streaks along the direction of the waves	14
8	34-40	Moderately high waves of greater length, edges of crests break into spindrift, foam blown in well-marked streaks in the direction of the wind	18
9	41-47	High waves, dense streaks of foam, sea begins to roll, spray affects visibility	23
10	48-55	Very high waves with overhanging crests, foam in great patches blown in dense white streaks. The whole surface of sea takes on a white appearance. Visibility is affected.	29